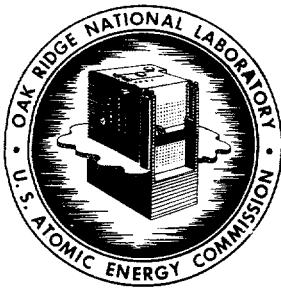


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Special Distribution

**ORNL** *41*  
**CENTRAL FILES NUMBER**

68-7-2

COPY NO. **45**

DATE: July 1, 1968

SUBJECT: Radioactive Waste Disposal Operations Report for the month of May 1968

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## LIQUID WASTE

## Release to Clinch River

River contamination caused by ORNL discharges was 1.76% of the MPC<sub>w</sub> for releases to uncontrolled areas (see Figure 1). The increase in the average concentration during 1968 to date over that in 1967 and the comparatively high concentration this month resulted from low river flows. The flow during this month was only 11% of the long-term average. Strontium contributed 95.1% to the calculated percent of the MPC<sub>w</sub>.

## White Oak Creek Monitoring

The main contaminants released to White Oak Lake were 0.38 curie of strontium; 0.48 curie of ruthenium; 0.29 curie of cesium and 0.30 curie of cobalt. The bulk of the strontium and cesium came from the process waste system. Virtually all of the ruthenium and cobalt came from soil disposal areas which are currently out of service (Table 1). There was no significant release of alpha activity.

Figures 2 and 3 compare radioactive releases into White Oak Lake on a monthly basis.

## Process Waste

A total of 12.1 million gallons of waste water was chemically treated this month. A summary of operating data is given in Table 2. Table 3 lists the waste discharges into the system. Figure 4 compares monthly strontium discharges into the creek and Figure 5 the volumes of waste handled.

## Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 306 gph. A summary of operating data is given below:

|   | <u>Gallons</u> |
|---|----------------|
| Total volume generated                      | 260,000        |
| Volume transferred to evaporator            | 228,000        |
| Volume of concentrate returned to tank farm | 7,000          |
| Tank Farm free space at beginning of month  | 576,000        |
| Tank Farm free space at end of month        | 537,000        |

The main contributors to the ILW system are listed below. The volume of waste generated this month is compared to volumes in previous months in Figure 6.

|  | <u>Gallons</u> |
|--|----------------|
| 1. Fission Products Development Laboratory | 43,000         |
| 2. Building 3019                           | 38,000         |
| 3. High Flux Isotope Reactor               | 38,000         |
| 4. Reactor Complex                         | 36,000         |
| 5. 4500 Complex                            | 27,000         |
| 6. Radioisotopes Processing Area           | 15,000         |
| 7. Building 3026-D                         | 12,000         |
| 8. Nuclear Safety Pilot Plant              | 12,000         |

#### Gaseous Waste

The ORNL stacks released 2.26 curies of  $^{131}\text{I}$ . This month's discharges are compared to those in previous months in Figures 7 and 8. The individual stack releases are listed in Table 4. There was no significant release of alpha activity.

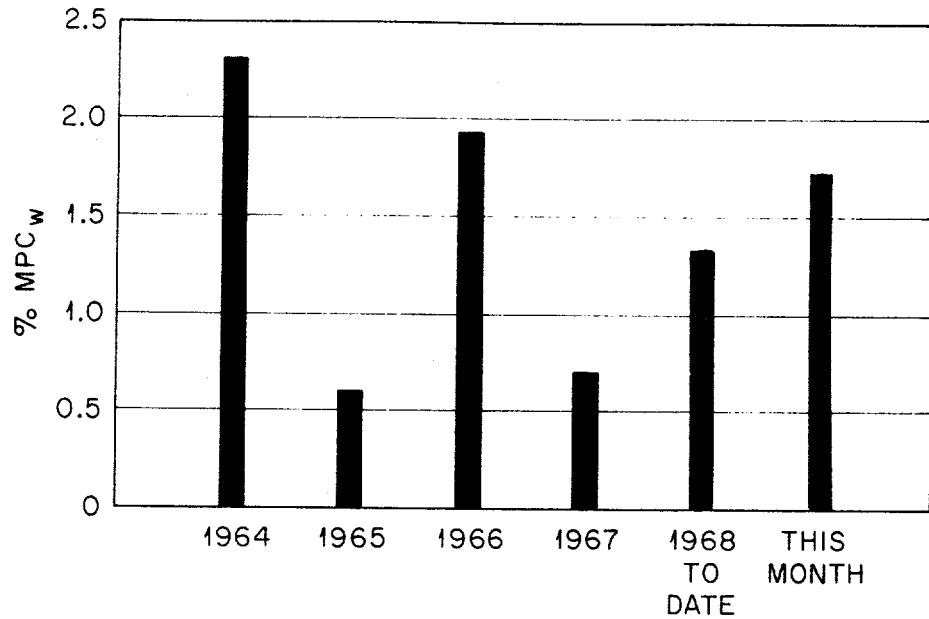


Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.  
(Health Physics Measurements at White Oak Dam)

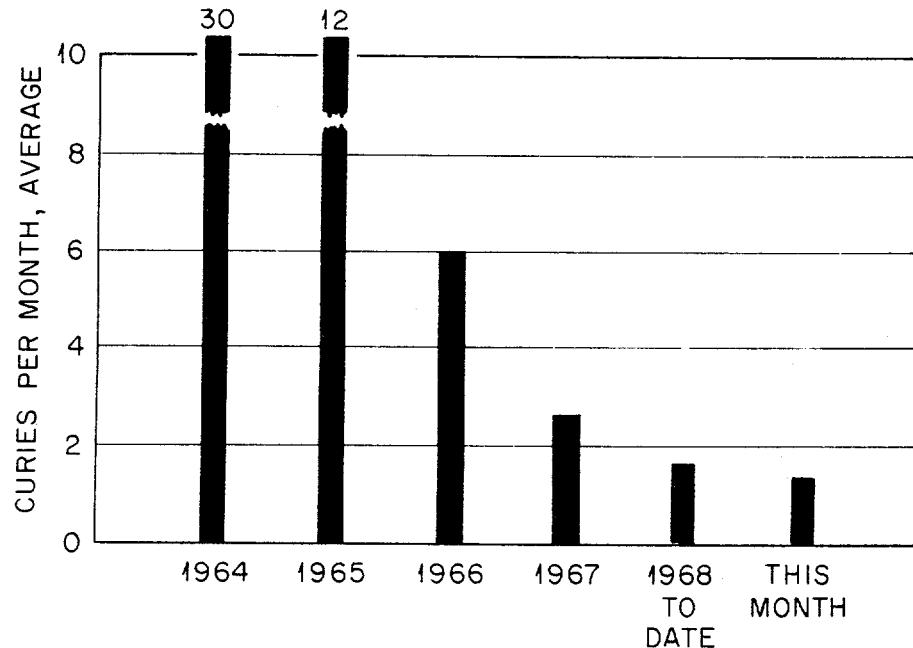


Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

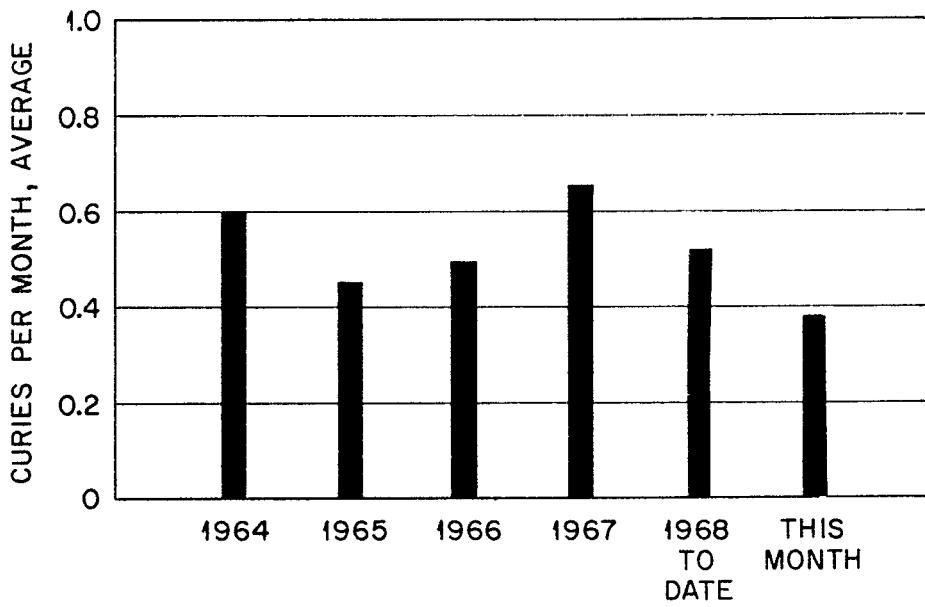


Fig. 3. Total  $^{89}\text{Sr}$  and  $^{90}\text{Sr}$  Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

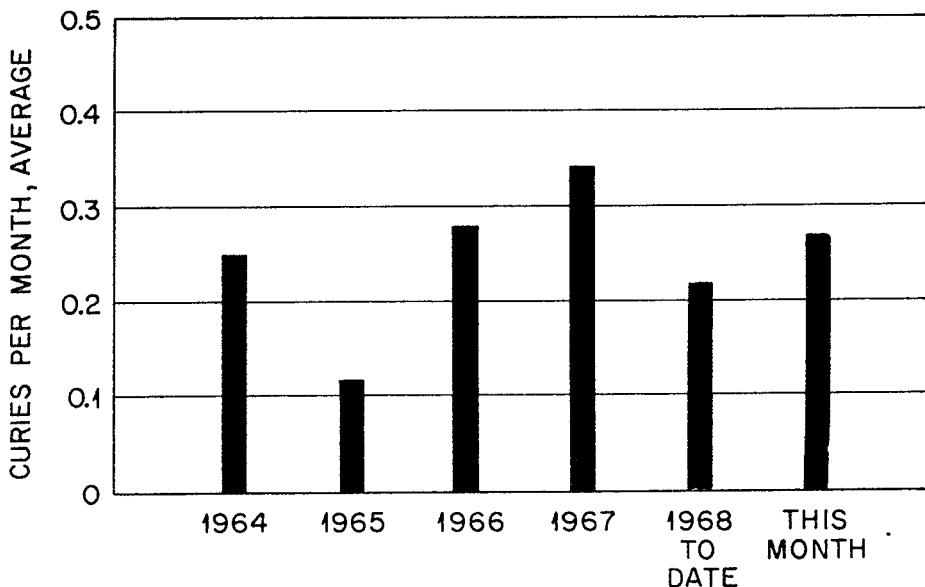


Fig. 4.  $^{89}\text{Sr}$  and  $^{90}\text{Sr}$  Discharge in Process Waste to White Oak Creek.

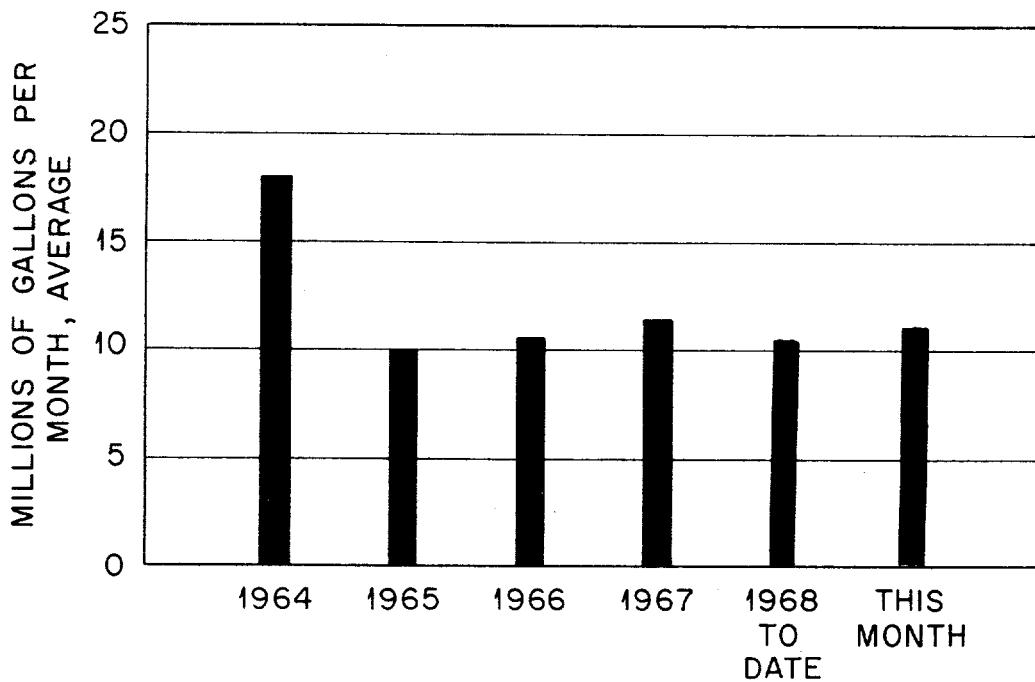


Fig. 5. Process Waste Volumes.

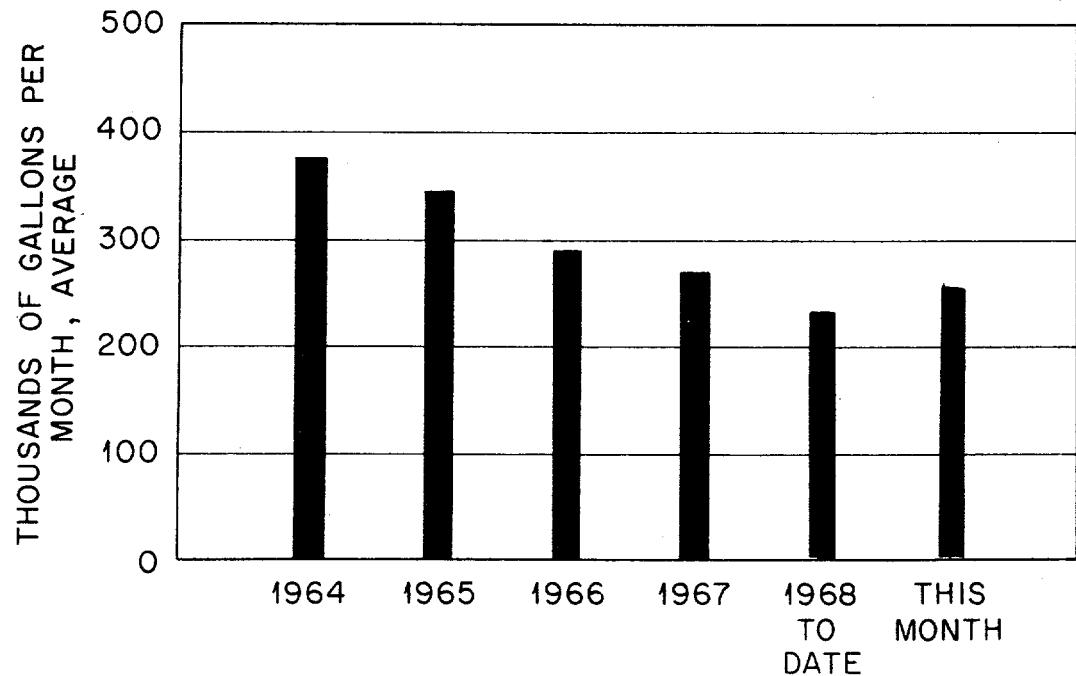


Fig. 6. Intermediate-Level Waste Volumes.

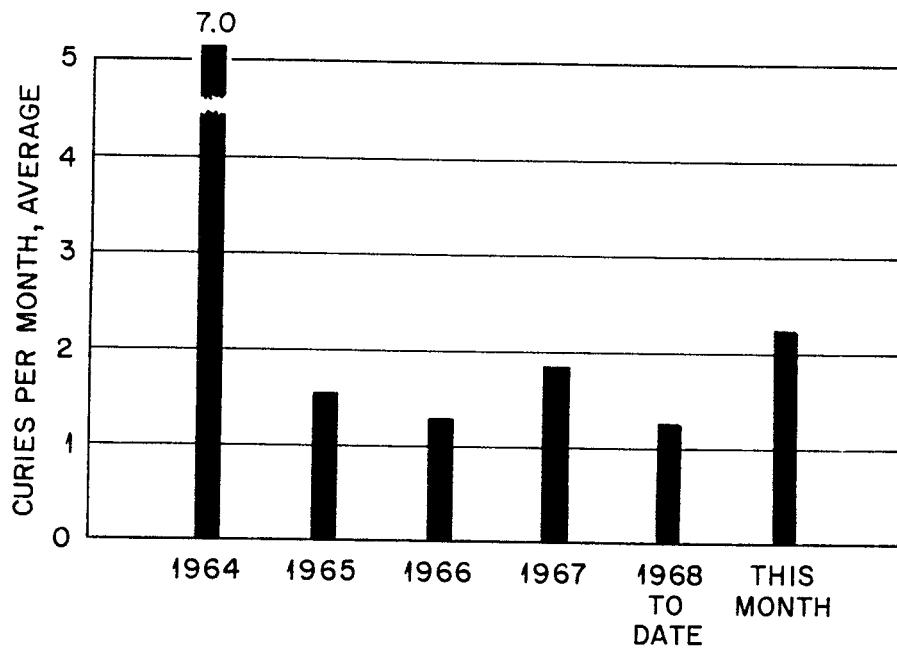


Fig.7. Total Activity Released in Gaseous Waste (Mainly  $^{131}\text{I}$ ;  
Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's  
Maximum Permissible Operating Level is 13 curies Per Quarter.

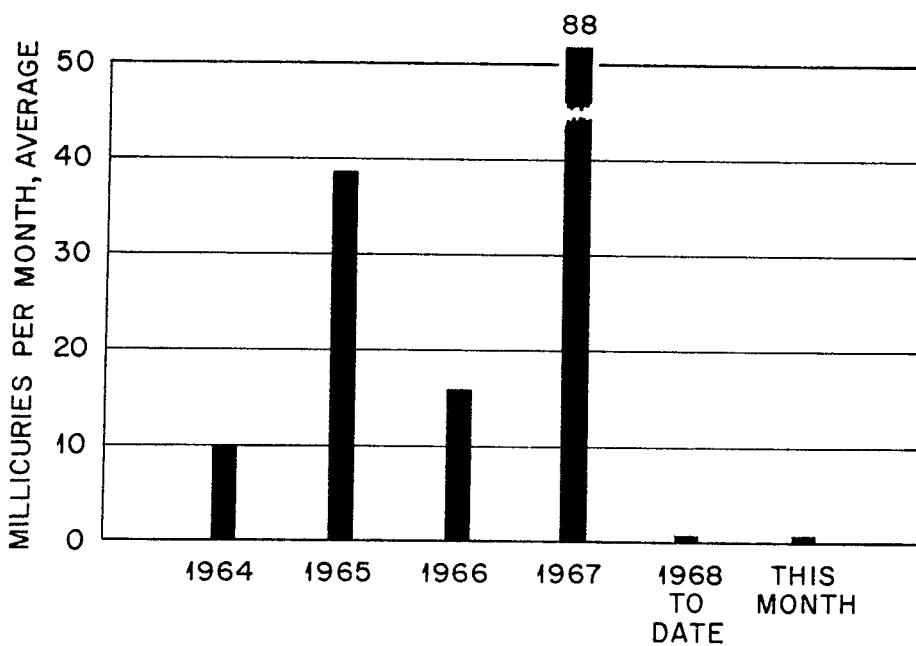


Fig.8. Filterable Activity Released in Gaseous Waste.

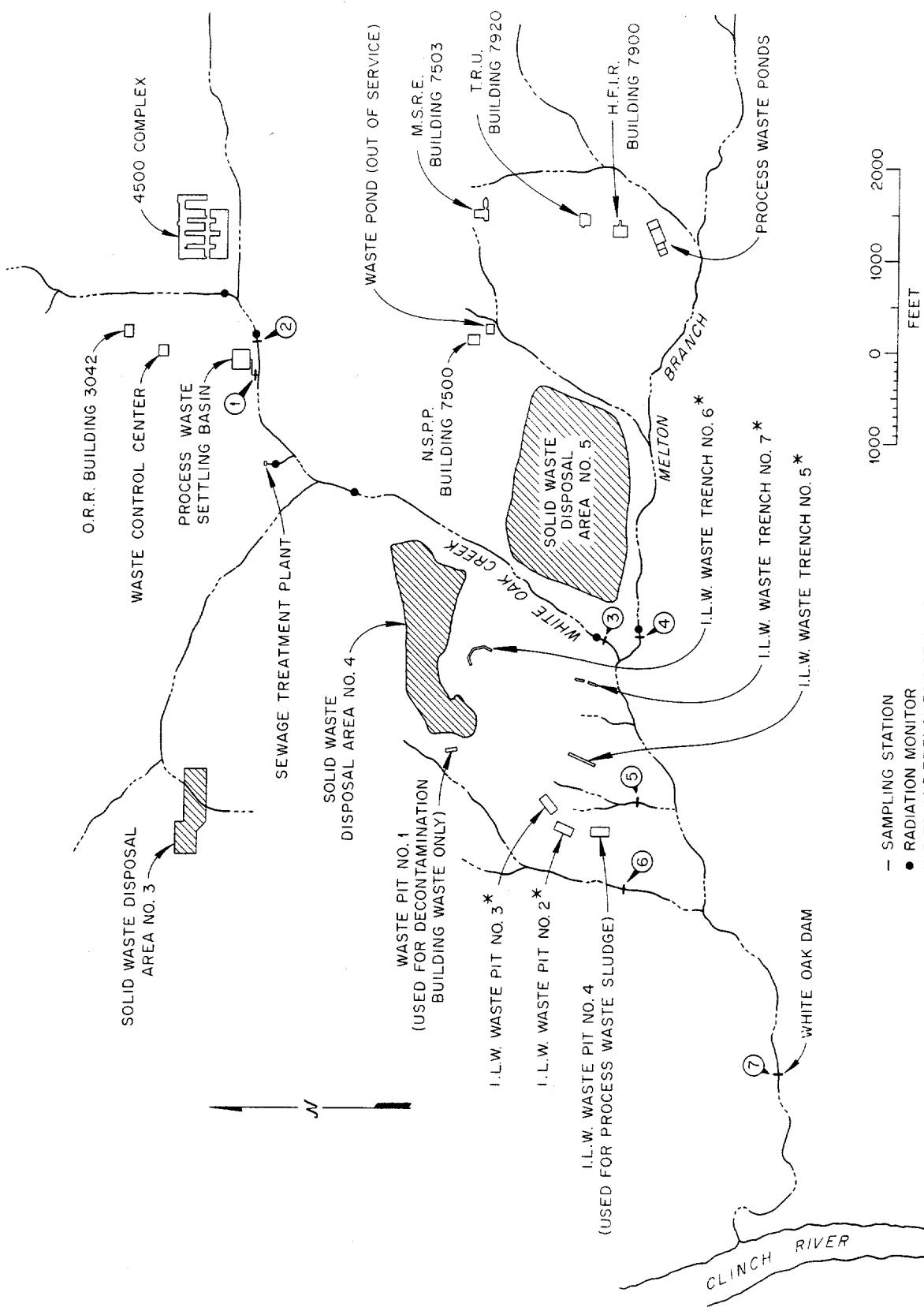


Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

## ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

| Source  | Monitoring Station<br>Number <sup>a</sup> | Activity (Curies) |                   |                   |                        |
|---|---|-------------------|-------------------|-------------------|------------------------|
|   |   | Total Sr          | <sup>106</sup> Ru | <sup>137</sup> Cs | <sup>60</sup> Co       |
| Process waste   | 1   | 0.27              | 0.06              | 0.44              | detected none          |
| Miscellaneous discharges from east end of plant               | 2   | < 0.01            | < 0.01            | < 0.01            | detected none          |
| Total discharge from Bethel Valley Area                       | 3   | 0.33              | 0.01              | 0.26              | detected none          |
| Total discharge from Melton Valley Area                       | 4   | 0.05              | < 0.01            | < 0.01            | detected none          |
| East waste pit seepage  | 5   | < 0.01            | 0.36              | 0.03              | detected 0.05          |
| West waste pit seepage  | 6   | < 0.01            | 0.11              | < 0.01            | 0.25 0.64              |
| Total discharge from all sources                              | 3,4,5,6                                   | 0.38              | 0.48              | 0.29              | 0.30 1.45              |
| White Oak Dam to Clinch River<br>(Health Physics measurement) | 7   | 0.20              | 0.11              | 0.06              | 0.07 0.71 <sup>b</sup> |
|   |   |                   | ∞                 |                   |                        |

<sup>a</sup>Refers to Fig. 9<sup>b</sup>Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH:  $12.1 \times 10^6$  galTOTAL WASTE VOLUME DISCHARGED  
TO WHITE OAK CREEK THIS MONTH:  $13.0 \times 10^6$  gal

| NUCLIDES               | PLANT INFLUENT<br>(Curies) | PLANT EFFLUENT AND<br>SETTLING BASIN DIS-<br>CHARGE (Curies) | PERCENT REMOVED BY<br>TREATMENT PLANT AND<br>SETTLING BASIN |
|------------------------|----------------------------|--|---|
| Total Sr <sup>a</sup>  | 1.32                       | 0.27   | 80  |
| <sup>103,106</sup> Ru  | none detected              | 0.07   | --  |
| <sup>60</sup> Co       | 0.06                       | none detected  | 100   |
| <sup>137</sup> Cs      | 3.79                       | 0.44   | 88  |
| Gross Beta<br>Analysis | 75 c/m/ml                  | 12 c/m/ml  | 84  |

<sup>a</sup>Past analyses indicate that "Total Sr" is greater than 90% <sup>90</sup>Sr.

TABLE 3

## PROCESS WASTE DISCHARGES

| SOURCE                                     | GROSS BETA ACTIVITY<br>AVERAGE, c/m/ml | GROSS BETA ACTIVITY <sup>a</sup> |               | VOLUME             |               |
|--|--|----------------------------------|---------------|--------------------|---------------|
|  |  | CURIES                           | % OF<br>TOTAL | MILLION<br>GALLONS | % OF<br>TOTAL |
| 1. Reactor Operations                      | 43                                     | 0.65 <sup>b</sup>                | 68.4          | 1.08               | 11.6          |
| 2. Radioisotope Processing Area            | 5                                      | 0.11                             | 11.6          | 1.46               | 15.7          |
| 3. Buildings 3503 and 3508                 | 2                                      | 0.06                             | 6.3           | 2.08               | 22.4          |
| 4. Buildings 3025 and 3026                 | 1                                      | 0.03                             | 3.2           | 2.25               | 24.3          |
| 5. Building 3019                           | 0                                      | --                               | --            | 0.18               | 1.9           |
| 6. Fission Products Development Laboratory | 9                                      | < 0.01                           | --            | 0.02               | 0.2           |
| 7. Waste Evaporator, Building 2531         | 6                                      | 0.08                             | 8.4           | 0.99               | 10.7          |
| 8. Buildings 3525 and 3550                 | 0                                      | --                               | --            | 0.72               | 7.8           |
| 9. Building 2026                           | < 1                                    | --                               | --            | < 0.01             | --            |
| 10. Building 2001                          | 3                                      | 0.02                             | 2.1           | 0.50               | 5.4           |

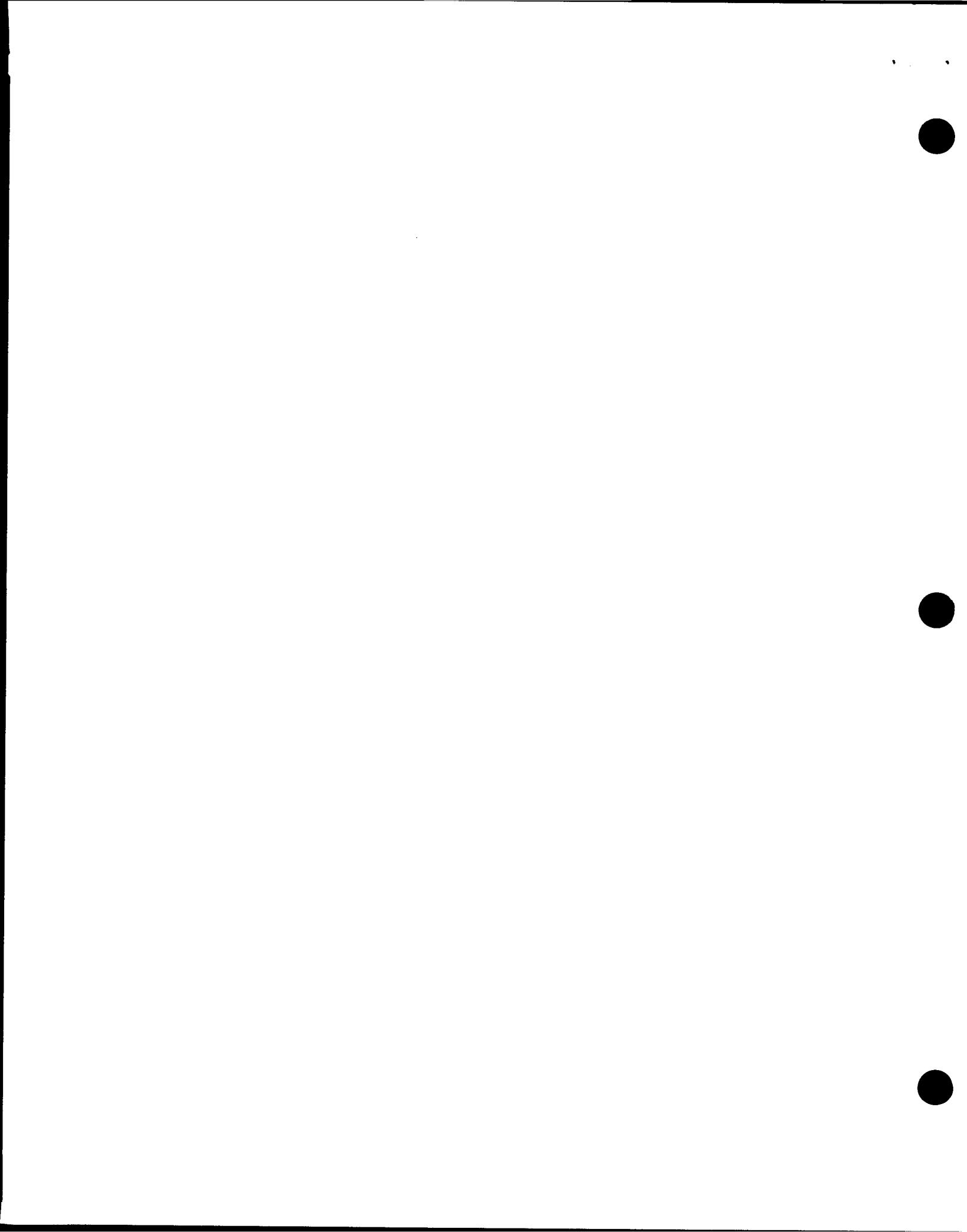
<sup>a</sup>Approximation - The method of analysis used in determining gross beta activity is not sensitive to energies below that of  $^{90}\text{Sr}$ .

<sup>b</sup>The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4  
ACTIVITY RELEASED IN GASEOUS WASTES

| Area  | Stack No. | Activity <sup>a</sup><br>(Curies) |
|---|-----------|-----------------------------------|
| HRLAL                                       | 2026      | 0.01                              |
| Central Radioactive Gas Disposal Facilities | 3039      | 2.25                              |
| Radiochemical Processing Pilot Plant        | 3020      | < 0.01                            |
| MSRE  | 7512      | < 0.01                            |
| HFIR  | 7911      | < 0.01                            |
| Total activity in gases released            |           | 2.26                              |

<sup>a</sup>Activity primarily  $^{131}\text{I}$  as noted in text



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